

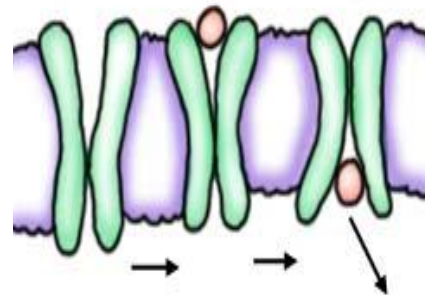
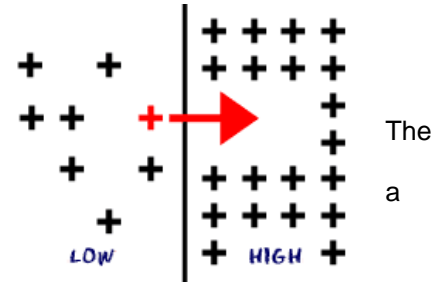
## ACTIVE TRANSPORT - ENERGY TO TRANSPORT

**Active transport** describes what happens when a cell uses **energy** to transport something. We're talking about the movement of individual molecules across the [cell membrane](#). liquids inside and outside of cells have different substances. Sometimes a cell has to work and use some energy to maintain proper balance of ions and molecules.

## PROTEINS IN THE MEMBRANE

Active transport usually happens across the cell membrane. There are thousands of proteins embedded in the cell's lipid bilayer. Those proteins do much of the work in active transport. They are positioned to cross the membrane so one part is on the inside of the cell and one part is on the outside. Only when they cross the bilayer are they able to move molecules and ions in and out of the cell. The [membrane proteins](#) are very specific. One protein that moves glucose will not move calcium (Ca) ions. There are hundreds of types of these membrane proteins in the many cells of your body.

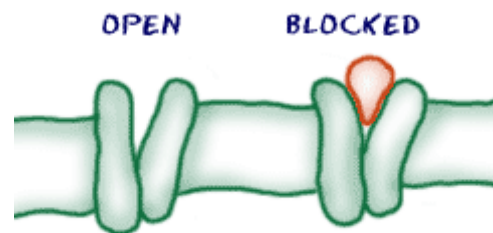
Many times, proteins have to work **against a concentration gradient**. That term means they are pumping something (usually ions) from areas of lower to higher concentration. This happens a lot in [neurons](#). The membrane proteins are constantly pumping ions in and out to get the membrane of the neuron ready to transmit electrical impulses.



ONE METHOD OF TRANSPORT THROUGH THE MEMBRANE

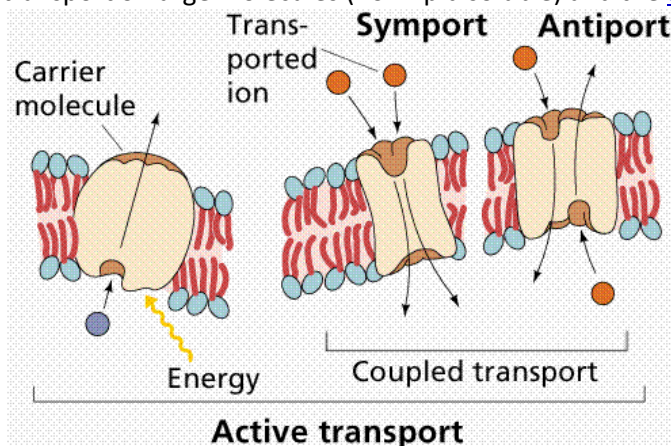
## STOPPING THE TRANSPORT

Even though these proteins are working to keep the cell alive, their activity can be stopped. There are poisons that stop the membrane proteins from transporting their molecules. Those poisons are called **inhibitors**. Sometimes the proteins are destroyed and other times they are just plugged up.



INHIBITOR BLOCKING A CHANNEL

[Active transport](#) requires the cell to spend energy, usually in the form of [ATP](#). Examples include transport of large molecules (non-lipid soluble) and the [sodium-potassium pump](#).



## Carrier-assisted Transport

### Types of transport molecules

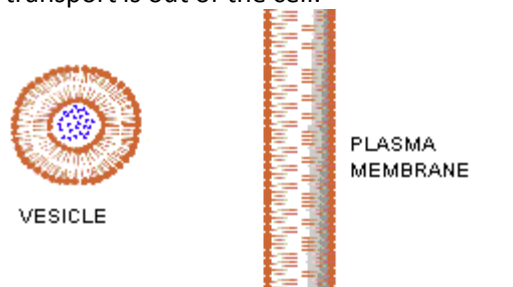
Uniport transports one solute at a time.

Symport transports the solute and a cotransported solute at the same time in the same direction.

Antiport transports the solute in (or out) and the co-transported solute the opposite direction. One goes in the other goes out or vice-versa.

### Vesicle-mediated transport

[Vesicles](#) and [vacuoles](#) that fuse with the cell membrane may be utilized to release or transport chemicals out of the cell or to allow them to enter a cell. [Exocytosis](#) is the term applied when transport is out of the cell.



See Animation on web

the vesicle on the left, and how it fuses with the cell membrane on the right, expelling the vesicle's contents to the outside of the cell.

[Endocytosis](#) is the case when a molecule causes the cell membrane to bulge inward, forming a vesicle.

[Phagocytosis](#) is the type of endocytosis where an entire cell is engulfed.

Pinocytosis is when the external fluid is engulfed. Receptor-mediated endocytosis occurs when the material to be transported binds to certain specific molecules in the membrane.

Examples include the transport of insulin and cholesterol into animal cells.

